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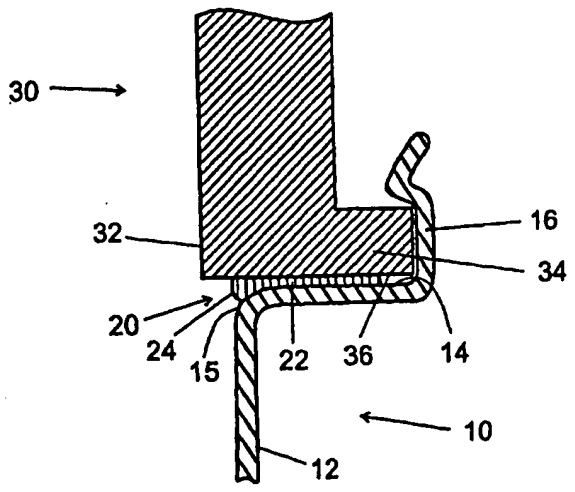
Veröffentlicht
*Mit internationalem Recherchenbericht.*

(54) Title: METHOD FOR MOUNTING THE OIL PAN ON AN ENGINE BLOCK OF AN INTERNAL COMBUSTION ENGINE, INTERNAL COMBUSTION ENGINE IN WHICH THE OIL PAN IS FASTENED TO THE ENGINE BLOCK ACCORDING TO SAID METHOD, AND FLANGE CONNECTIONS PRODUCED ACCORDING TO THE INVENTIVE METHOD

(54) Bezeichnung: VERFAHREN ZUM ANBRINGEN DER ÖLWANNE AN EINEM MOTORBLOCK EINER VERBRENNUNGSKRAFTMASCHINE, VERBRENNUNGSKRAFTMASCHINE, BEI DER DIE ÖLWANNE NACH DIESEM VERFAHREN AM MOTORBLOCK BEFESTIGT IST, UND FLANSCHVERBINDUNGEN, DIE NACH DIESEM VERFAHREN HERGESTELLT SIND

(57) Abstract

In order to mount the oil pan (10) on the engine block (30) of an internal combustion engine, a sealing element is produced between the engine block (30) and the oil pan (10) using a hardenable composition (20). When in a hardened state, the adhesion of the composition (20) is sufficiently large enough to hold the oil pan (10) to the engine block (30). The adhesion should equal at least 0.5 N/mm$^2$, in particular, greater than 0.8 N/mm$^2$. The hardenable composition (20) can be comprised of a silicon material. The oil pan (10) can be fixed to the engine block (30) at least during the hardening of the composition (20). To this end, the edge of the oil pan is constructively designed such that an independent fixation results when joining the oil pan (10) to the engine block (30).




(57) Zusammenfassung

Zum Anbringen der Ölwanne (10) an dem Motorblock (30) einer erbr ennungskraftmaschine wird eine Abdichtung zwischen Motorblock (30) und Ölwanne (10) mittels einer aushärtbaren Zusammensetzung (20) hergestellt. Die Adhäsion der Zusammensetzung (20) im ausgehärteten Zustand ist ausreichend gross, um die Ölwanne (10) am Motorblock (30) zu halten. Die Adhäsion sollte mindestens 0,5 N/mm$^2$, insbesondere mehr als 0,8 N/mm$^2$, betragen. Die aushärtbare Zusammensetzung (20) kann eine Silikon–Masse sein. Die Ölwanne (10) kann zumindest während des Aushärtens der Zusammensetzung (20) an dem Motorblock (30) fixiert sein. Dazu kann der Ölwannenrand konstruktiv so ausgelegt sein, dass beim Fügen der Ölwanne (10) an den Motorblock (30) eine selbständige Fixierung erfolgt.

curing the bonding agent attached to the engine block in conventional manner by screws and seals.

There is known from EP-A-0 284 027 an anaerobically vulcanized sealing composition, as well as its use on parts of hydraulically controlled mechanisms and combustion engines, such as the connection between a flange part to an oil sump and an engine block, a connection between cylinder head and cylinder head cover and a connection at the gear box. As in particular the mention as seal of the connection between cylinder head and cylinder head cover shows, screws are hear additionally used as fastening elements.

A method of making polysiloxane sealings is known from EP-A-0 409 079, making a seal to the flange of a motor vehicle oil sump being quoted as an application example. Openings for the fastening bolts are provided for in the flange of the oil sump in the respective drawing so that the fastening bolts are here, too, apparently used as connecting elements.

In a process known from DE-U-298 12 978, the oil sump is also secured to the engine block in the conventional manner by screws. To this end, the engine block must be provided with a number of threaded holes and a corresponding number of screws must then be screwed in.

The object of the invention is to save on these processes and components.

This object is achieved in accordance with the invention by the adhesion of the curable composition when cured being sufficient to secure the oil sump to the engine block and by threaded bolts not being used as fastening elements. There is in addition with the process according to the invention that

the oil sump is fixed to the engine block at least during the curing of the composition.

It has shown that the adhesion of curable compositions or adhesives is sufficient to secure an oil sump permanently and securely to an engine block. Preferably an adhesive with an adhesion of at least 0.5 $N/mm^2$, especially of more than 0.8 $N/mm^2$, is used.

With the securing of the oil sump to the engine block in accordance with the invention, the threaded holes in the engine block are unnecessary and there is no screwing-in of the securing screws. The oil sump can easily be stamped from steel sheet. A machining, e.g. a surface grinding or milling, of the sealing surfaces at the engine block and at the oil sump is not necessary as the curable composition can equalize unevennesses up to 0.5 mm or even 1 mm. The maximum allowable unevenness is limited by the fact that, with larger gaps between the engine block and the oil sump, there is the danger that the curable composition will be blown out in the generally customary leak test by displacement with air (blow-out test) on the finally assembled engine. Some 30 minutes are needed to assemble the engine, and the composition cannot cure sufficiently within this time span to resist the overpressure of about 0.5 bar applied in the leak test with thicker layer thicknesses especially if the curing time depends on the thickness of the layer as in the case of silicone adhesives which cure by humidity.

As there are no securing screws for the oil sump, there is a reduction in costs as a result of a decrease in the number of components, a reduction in the assembly time and a simplification of the manufacture of the engine block due to the absence of the threaded holes. Further, cost advantages result from the fact that the oil sump can be a stamped part.

The curable composition can be any adhesive which is suitble for the materials and which possesses a sufficient adhesion for the materials from which the engine block and the oil sump are made, that is metal, especially grey cast iron, aluminum-magnesium alloys and - for the oil sump - plastic. Obviously, the composition must be sufficiently resistant to the media used (oil, water/glycol, antifreeze). FIP (formed in place) products are particularly suited. A suitable curable composition is especially LOCTITE® RTV Silikon 5900 (RTV = room temperature vulcanization).

As such compositions have curing times of up to some days, it is generally necessary to attach the oil sump to the engine block during this time by a self-fixing connection. Clamps and snap connections are suitable for this. The edge of the oil sump can, for example, snap onto a flange of the engine block, or individual holding grips which are bent round the flange of the engine block can be provided at that edge. The edge of the oil sump can also be crimped or curled round the flange on the engine block. As these fixing means are only necessary until the curable composition has cured, they can be removed afterwards if need be and used again.

The sealing surfaces on the engine block and on the oil sump are preferably formed such that there is an uneven layer thickness over the width of the sealing surfaces. To this end, the edge of one or both of the sealing surfaces can have a chamfer with a angle of, e.g., 30° and a width of about 2 mm or be rounded off with a radius of about 4.5 mm, the gap formed being partially or completely filled with the curable

curable composition. The curable composition is applied in known manner. The volume of the gap is to be larger than the amount of curable composition applied so that none of the curable composition is pressed out at the edges. The maximum size of the gap is to be chosen such that the wetting or adhesion of the freshly-applied composition is sufficient to retain the composition in the gap. The curable composition does not need to be applied or distributed over the whole width of the sealing surfaces. A gap free application in the form of a bead is sufficient. With corresponding flange geometry, the application can, e.g., also be at the edge surface of the flange of the engine block, i.e. on a surface which lies parallel to the direction of the assembly comprised of the oil sump and engine block.

The process according to the invention is especially suitable for cases in which the oil sump need not contribute to the overall rigidity of the engine or other machine.

The advantages of the invention have a particularly clear effect when attaching an oil sump to the engine block. The invention can, however, on principle be used when making flange connections with which threaded bolts were hitherto used as connecting elements. The process according to the invention is also suitable in the same manner, e.g., for the attachment of valve covers and of covers or lids to timing cases or gear boxes.

An embodiment example of the invention is explained in more detail in the following with reference to the drawing. There are shown in:

Fig. 1 in section, the edge of the oil sump and of the oil sump opening of the engine block with a first embodiment of the fixing means;

Figs. 2 to 4 in section, the edge of the oil sump with other

embodiments of the fixing means.

Fig. 1 shows an oil sump 10 which is fixed to an engine block 30 by means of a curable composition 20. The edge 12 of the oil sump 10 is bent to produce a substantially flat first sealing surface 14 (bend 15). The engine block 30 has an oil sump opening 32 surrounded by a flange which has a substantially flat second sealing surface 36. There is a layer 22 of the curable composition 20 between the two sealing surfaces 14, 36.

The bend 15 of the edge 12 of the oil sump 10 has a radius of about 4.5 mm so that the distance of the sealing surfaces 14, 36 from the inside of the oil sump 10 diminishes progressively. The thickness of the layer 22 of the curable composition 20 located between the sealing surfaces 14, 36 is, therefore, not uniform but is at its greatest on the inside of the oil sump 10 and decreases outwards.

Bent against the outer edge of the sealing surface 14 of the oil sump 10 is a fixing edge 16 which encompasses the flange 34 of the engine block 30 to the extent that the oil sump is fixed to the engine block 30 during the further assembly of the engine and the motor vehicle. The fixing edge 16 snaps or locks round the flange 34 when the oil sump 10 is pressed against the flange 34.

Later during the running of the motor vehicle, the fixing edge 16 simultaneously forms a safeguard against a detachment of the oil sump 10 from the engine block 30 in the event of an accident or other sudden stress impact.

Fig. 2 shows another possibility for fixing the oil sump 10 to the engine block 30. In a manner similar to that in Fig. 1, a fixing edge 16 is provided but barb-like tongues 18 which rest against the upper side of the flange 34 are pressed out from the fixing edge 16.

Fig. 3 shows a fixing of the oil sump 10 to the engine block 30 in which the fixing edge 16 of the oil sump 10 is reshaped after the application of the curable composition 20 and the joining of the oil sump 10 and the engine block 30 so that it encompasses the flange 34. This reshaping need not extend over the entire edge 16 of the oil sump 10. A pointwise fixing at a distance of, e.g., 20 cm is generally sufficient.

Fig. 4 shows an embodiment in which the edge 16 of the oil sump 10 forms an outwardly directed flange 38. After the application of the curable composition 20 and the joining of the oil sump 10 and the engine block 30, clamps 40 are attached which hold the oil sump 10 against the flange 34 of the engine block 30 during the curing of the composition 20.

Example:
To join together an oil sump 10 stamped from steel sheet and a cast steel engine block 30, the sealing surfaces 14, 36 are cleaned of loose dirt particles and dried. The sealing surfaces 14, 36 have a covering width of about 9 mm, and a bead about 3 mm in diameter of the curable composition 20 - which corresponds to about 10 g/m - is applied to one or both sealing surfaces 14, 36. LOCTITE® RTV-Silikon 5900 is used as curable composition 20. The oil sump 10 is then moved up onto the flange 34 of the engine block 30 so that the fixing edge 16 snaps around the flange 34. The bead of the curable composition 20 is pressed out to give a layer 22 about 0.5 mm thick and a part of the composition 20 is pressed inwards to the bend 15 of the edge 12 where the composition 20 forms a meniscus 24 between the oil sump 10 and the flange 34 of the engine block 30. Because of the high viscosity of the curable composition 20, the meniscus 24 is convex.

List of reference numerals

10 oil sump

12 edge

14 sealing surface

15 bend

16 fixing edge

18 tongues

20 composition

22 layer

24 meniscus

30 engine block

32 oil sump opening

34 flange

36 sealing surface

38 flange

40 clamp

Fig. 1

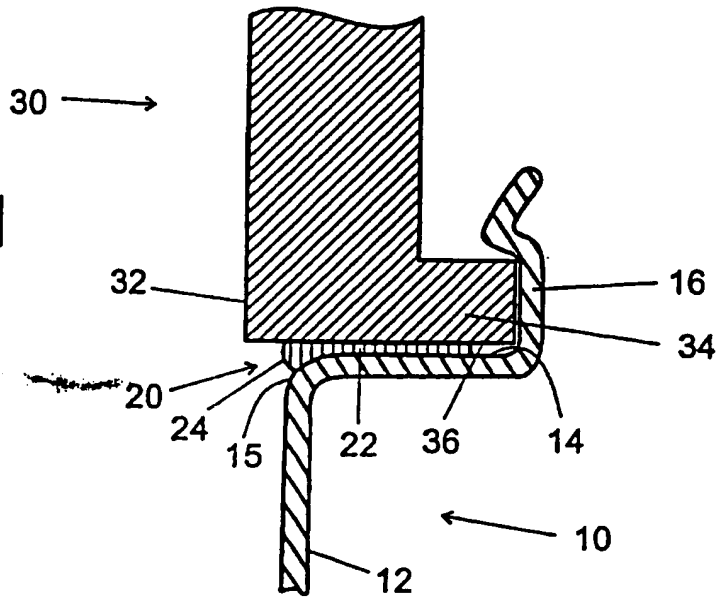



Fig. 2

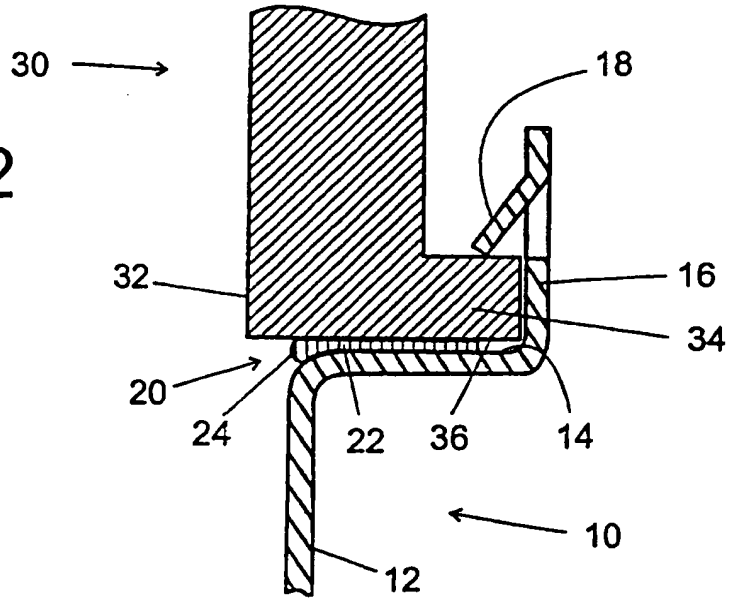


Fig. 3

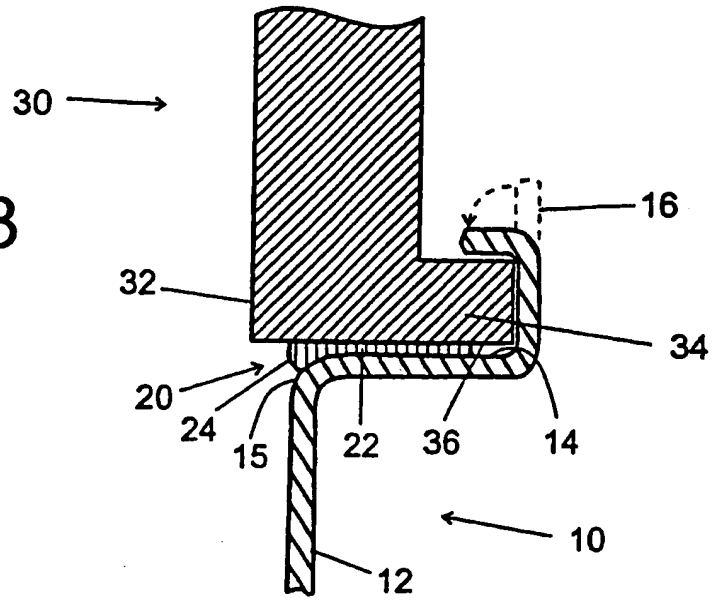
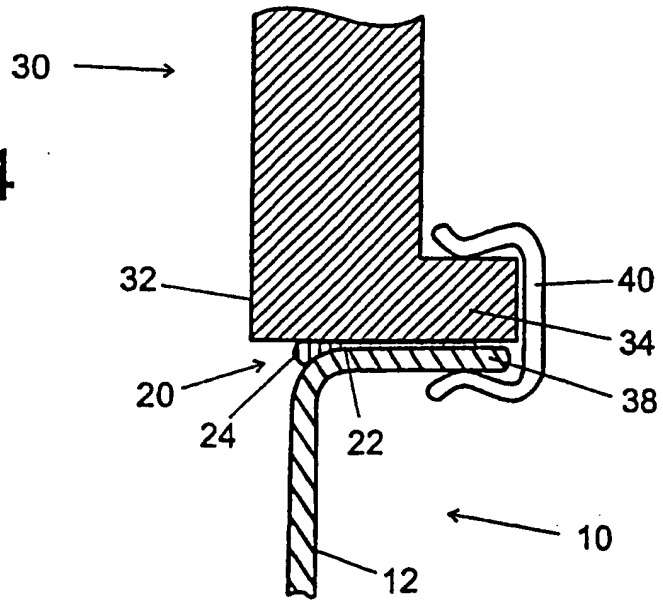



Fig. 4



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## Patent Claims

1. Process for attaching the oil sump (10) to an engine block (30) of a combustion engine, a seal being made by means of a curable composition (20) between a first sealing surface (14) on the oil sump (10) and a second sealing surface (36) on the engine block (30), for which the curable composition is applied to one or to both sealing surfaces, characterized
   - in that a curable composition (20) is used whose adhesion when cured is sufficient to secure the oil sump (10) to the engine block (30),
   - in that threaded bolts are not used as fastening elements and
   - in that the oil sump (10) is fixed to the engine block (30) at least during the curing of the composition (20).

2. Process according to claim 1, characterized in that a curable composition (20) with an adhesion of at least 0.5 $N/mm^2$, especially of more than 0.8 $N/mm^2$, is used.

3. Process according to claims 1 or 2, characterized in that the curable composition (20) is a silicone composition.

4. Process according to one of claims 1 to 3, characterized in that an oil sump (10) stamped from steel sheet or made from plastics material and a cast aluminum or grey cast iron engine block (30) are used.

5. Process according to one of claims 1 to 4, characterized in that the edge of the oil sump is designed such that a

self-fixing takes place when the oil sump (10) is joined to the engine block (30).

6. Process according to claim 5, characterized in that the oil sump (10) has a fixing edge (16) and the engine block (30) has a flange (34) and in that the fixing of the oil sump (10) takes place by the snapping of the fixing edge (16) onto the flange (34).

7. Process according to one of claims 1 to 4, characterized in that barb-like tongues (18) which rest against a flange (34) on the engine block (30) are formed at the edge (12) of the oil sump (10).

8. Process according to one of claims 1 to 4, characterized in that the edge of the oil sump is designed such that the oil sump (10) is fixable to the engine block (30) by a reshaping process taking place after joining.

9. Process according to one of claim 1 to 4, characterized in that after the oil sump (10) has been joined to the engine block (30), holding clamps (40) are attached in order to fix the oil sump (10) to the engine block (30).

10. Process according to one of the claims 1 to 9, characterized in that the sealing surfaces (14, 36) are shaped such that the sealing gap formed between them increases in size inwards.

11. Combustion engine having an engine block (30) and an oil sump (10) attached thereto, characterized
- the oil sump (10) is attached to the engine block (30) with a curable composition (20) whose adhesion when cured is sufficient to secure the oil sump (10) to the engine block (30) and

- in that threaded bolts are not present as fastening elements.

12. Combustion engine according to claim 11, characterized in that the composition (20) when cured has an adhesion of at least 0.5 $N/mm^2$, especially of more than 0.8 $N/mm^2$.

13. Combustion engine according to claims 11 or 12, characterized in that the curable composition (20) is a silicone composition.

14. Combustion engine according to one of claims 11 to 13, characterized in that the oil sump (10) is stamped from sheet steel or made from plastics material and the engine block (30) consists of cast aluminum or grey cast iron.

15. Combustion engine according to one of claims 11 to 14, characterized in that the edge of the oil sump is designed such that a self-fixing takes place when the oil sump (10) is joined to the engine block (30).

16. Combustion engine according to claim 15, characterized in that the oil sump (10) has a fixing edge (16) and the engine block (30) has a flange (34) and in that the fixing of the oil sump (10) takes place by the snapping of the fixing edge (16) onto the flange (34).

17. Combustion engine according to claim 15, characterized in that barb-like tongues (18) which rest against a flange (34) on the engine block (30) are formed at the edge (12) of the oil sump (10).

18. Combustion engine according to claim 15, characterized in that there are formed on the oil sump (10) and on the engine block (30) sealing surfaces (14, 36) which

are shaped such that the sealing gap formed between them increases in size inwards.

19. Flange connection with two flange elements between which a seal is made with a curable composition, characterized in that threaded bolts are not used as connecting elements.

8. Verfahren nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, daß** der Rand der Ölwanne oder des Deckels so ausgeführt ist, daß die Ölwanne (10) oder der Deckel durch ein nach dem Fügen erfolgendes Umformverfahren an dem Motorblock (30) bzw. Steuergehäuse oder Getriebe fixierbar ist.

9. Verfahren nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, daß** nach dem Fügen der Ölwanne (10) oder des Deckels an den Motorblock (30) bzw. das Steuergehäuse oder Getriebe Halteklammern (40) angebracht werden, um die Ölwanne (10) oder den Deckel an dem Motorblock (30) bzw. Steuergehäuse oder Getriebe zu fixieren.

10. Verfahren nach einem der Ansprüche 1 bis 9, **dadurch gekennzeichnet, daß** die Dichtflächen (14, 36) so geformt sind, daß sich der zwischen ihnen gebildete Dichtspalt nach innen vergrößert.

11. Verbrennungskraftmaschine mit einem Motorblock (30) und einer daran befestigten Ölwanne (10), wobei an der Ölwanne (10) eine erste Dichtfläche (14) und am Motorblock (30) eine zweite Dichtfläche (36) vorhanden ist, zwischen denen sich eine aushärtbare Zusammensetzung (20) befindet, **dadurch gekennzeichnet,**

    - **daß** die Ölwanne (10) mittels der aushärtbaren Zusammensetzung (20) an dem Motorblock (30) befestigt ist, deren Adhäsion im ausgehärteten Zustand ausreichend groß ist, um die Ölwanne (10) am Motorblock (30) zu halten und
    - **daß** keine Gewindebolzen als Befestigungselemente vorhanden sind.

12. Verbrennungskraftmaschine mit einem Steuergehäuse oder Getriebe und einem daran befestigten Deckel, wobei an dem Deckel eine erste Dichtfläche und am Steuergehäuse oder Getriebe eine zweite Dichtfläche vorhanden ist, zwischen denen sich eine aushärtbare Zusammensetzung befindet, **dadurch gekennzeichnet,**

    - **daß** der Deckel mittels der aushärtbaren Zusammensetzung an dem Steuergehäuse oder Getriebe befestigt ist, deren Adhäsion im ausgehärteten Zustand ausreichend groß ist, um den Deckel am Steuergehäuse oder Getriebe zu halten und
    - **daß** keine Gewindebolzen als Befestigungselemente vorhanden sind.

13. Verbrennungskraftmaschine nach Anspruch 11 oder 12, **dadurch gekennzeichnet, daß** die Zusammensetzung (20) im ausgehärteten Zustand eine Adhäsion von mindestens 0,5 N/mm$^2$, insbesondere von mehr als 0,8 N/mm$^2$, hat.

14. Verbrennungskraftmaschine nach Anspruch 11, 12 oder 13, **dadurch gek nnzeichnet, daß** die aushärtbare Zusammensetzung (20) ein Silikon-Masse ist.

15. Verbrennungskraftmaschine nach einem der Ansprüche 11, 13 oder 14, **dadurch gekennzeichnet, daß** die Ölwanne (10) aus Stahlblech gestanzt oder aus Kunststoff hergestellt ist und der Motorblock (30) aus Aluminium- oder Grauguß besteht.

16. Verbrennungskraftmaschine nach einem der Ansprüche 11 bis 15, **dadurch gekennzeichnet, daß** der Rand der Ölwanne bzw. des Deckels konstruktiv so ausgelegt ist, daß beim Fügen der Ölwanne (10) oder des Deckels an den Motorblock (30) bzw. das Steuergehäuse oder Getriebe eine selbständige Fixierung erfolgt.

17. Verbrennungskraftmaschine nach Anspruch 16, **dadurch gekennzeichnet, daß** die Ölwanne (10) bzw. der Deckel einen Fixierrand (16) und der Motorblock (30) bzw. das Steuergehäuse oder Getriebe einen Flansch (34) aufweist und daß die Fixierung der Ölwanne (10) bzw. des Deckels dadurch erfolgt, daß der Fixierrand (16) an dem Flansch (34) einschnappt.

18. Verbrennungskraftmaschine nach Anspruch 16, **dadurch gekennzeichnet, daß** am Rand (12) der Ölwanne (10) bzw. des Deckels widerhakenähnliche Zungen (18) ausgebildet sind, die sich gegen einen Flansch (34) am Motorblock (30) bzw. Steuergehäuse oder Getriebe abstützen.

19. Verbrennungskraftmaschine nach Anspruch 16, **dadurch gekennzeichnet, daß** an der Ölwanne (10) oder dem Deckel und an dem Motorblock (30) bzw. Steuergehäuse oder Getriebe Dichtflächen (14, 36) ausgebildet sind, die so geformt sind, daß sich der zwischen ihnen gebildete Dichtspalt nach innen vergrößert.

**Claims**

1. Process for attaching the oil sump (10) or the valve cover to an engine block (30) or a cover to a timing case or a gear box of a combustion engine, a seal being made by means of a curable composition (20) between a first sealing surface (14) on the oil sump (10) or the cover and a second sealing surface (36) on the engine block (30) or, respectively, the timing case or gear box for which the curable composition is applied to one or to both sealing surfaces (14, 36), **charact rized**

- **in that** the adhesion of the curable composition (20), when cured, is sufficient to secure the oil sump (10) to the engine block (30) or, respectively, the cover to the timing case or gear box,
- **in that** threaded bolts are not used as fastening elements and
- **in that** the oil sump (10) or the cover is fixed to the engine block (30) or, respectively, the timing case or gear box at least during the curing of the composition (20).

2. Process according to claim 1, **characterized in that** a curable composition (20) with an adhesion of at least 0.5 N/mm$^2$, especially of more than 0.8 N/mm$^2$, is used.

3. Process according to claims 1 or 2, **characterized in that** the curable composition (20) is a silicone composition.

4. Process according to one of claims 1 to 3, **characterized in that** an oil sump (10) stamped from steel sheet or made from plastics material and a cast aluminum or grey cast iron engine block (30) are used.

5. Process according to one of claims 1 to 4, **characterized in that** the edge of the oil sump or, respectively, the cover is designed such that a self-fixing takes place when the oil sump (10) is joined to the engine block (30) or, respectively, the cover to the timing case or the gear box.

6. Process according to claim 5, **characterized in that** the oil sump (10) or the cover has a fixing edge (16) and the engine block (30) or, respectively, the timing case or the gear box has a flange (34) and **in that** the fixing of the oil sump (10) or the cover takes place by the snapping of the fixing edge (16) onto the flange (34).

7. Process according to one of claims 1 to 4, **characterized in that** barb-like tongues (18) which rest against a flange (34) on the engine block (30) or, respectively, the timing case or the gear box are formed at the edge (12) of the oil sump (10) or, respectively, the cover.

8. Process according to one of claims 1 to 4, **characterized in that** the edge of the oil sump or the cover is designed such that the oil sump (10) is fixable to the engine block (30) or, respectively, the timing case or the gear box by a reshaping process taking place after joining.

9. Process according to one of claim 1 to 4, **characterized in that** after the oil sump (10) or the cover has been joined to the engine block (30) or, respectively, the timing case or the gear box, holding clamps (40) are attached in order to fix the oil sump (10) or the cover to the engine block (30) or, respectively, the timing case or the gear box.

10. Process according to one of the claims 1 to 9, **characterized in that** the sealing surfaces (14, 36) are shaped such that the sealing gap formed between them increases in size inwards.

11. Combustion engine comprising an engine block (30) and an oil sump (10) attached thereto, a first sealing surface (14) being present on the oil sump (10) and a second sealing surface (36) being present on the engine block (30) between which is a curable composition (20), **characterized**

- **in that** the oil sump (10) is attached to the engine block (30) by means of the curable composition (20) whose adhesion when cured is sufficient to secure the oil sump (10) to the engine block (30) and
- **in that** threaded bolts are not present as fastening elements.

12. Combustion engine comprising a timing case or a gear box and a cover attached thereto, a first sealing surface being present on the cover and a second sealing surface being present on the timing case or the gear box between which is a curable composition, **characterized**

- **in that** the cover is attached to the timing case or the gear box by means of the curable composition whose adhesion when cured is sufficient to secure the cover to the timing case or the gear box and
- **in that** threaded bolts are not present as fastening elements.

13. Combustion engine according to claim 11 or 12, **characterized in that** the composition (20) when cured has an adhesion of at least 0.5 N/mm$^2$, especially of more than 0.8 N/mm$^2$

14. Combustion engine according to claims 11, 12 or 13, **characterized in that** the curable composition (20) is a silicone composition.

15. Combustion engine according to one of claims 11, 13 or 14, **characterized in that** the oil sump (10) is stamped from sheet steel or made from plastics material and the engine block (30) consists of cast aluminum or grey cast iron.

16. Combustion engine according to one of claims 11 to 15, **characterized in that** the edge of the oil sump or, respectively, the cover is designed such that a self-fixing takes place when the oil sump (10)

or the cover is joined to the engine block (30) or, respectively, the timing case or the gear box.

17. Combustion engine according to claim 16, **characterized in that** the oil sump (10) or, respectively, the cover has a fixing edge (16) and the engine block (30) or, respectively, the timing case or the gear box has a flange (34) and **in that** the fixing of the oil sump (10) or, respectively, the cover takes place by the snapping of the fixing edge (16) onto the flange (34).

18. Combustion engine according to claim 16, **characterized in that** barb-like tongues (18) which rest against a flange (34) on the engine block (30) or, respectively, the timing case or the gear box are formed at the edge (12) of the oil sump (10) or, respectively, the cover.

19. Combustion engine according to claim 15, **characterized in that** there are formed on the oil sump (10) or the cover and on the engine block (30) or, respectively, the timing case or the gear box sealing surfaces (14, 36) which are shaped such that the sealing gap formed between them increases in size inwards.

**Revendications**

1. Procédé pour monter le carter d'huile (10) ou le cache-soupape sur un bloc moteur (30) ou un couvercle sur un carter de direction ou la transmission d'un moteur à combustion interne, un joint d'étanchéité étant réalisé au moyen d'une composition durcissable (20) entre une première surface d'étanchéité (14) sur le carter d'huile (10) ou le couvercle et une seconde surface d'étanchéité (36) sur le bloc moteur (30) et respectivement le carter de direction ou la transmission, la composition durcissable étant appliquée à cet effet sur l'une des surfaces d'étanchéité ou bien sur les deux (14,36), **caractérisé en ce**

   - **que** l'adhésion de la composition durcissable (20) une fois durcie est suffisamment importante pour maintenir le carter d'huile (10) sur le bloc moteur et respectivement le couvercle sur le carter de direction ou la transmission,
   - **qu**'aucun boulon fileté n'est mis en place en tant que moyen de fixation et
   - **que** le carter d'huile (10) ou le couvercle sont fixés sur le bloc moteur (30) et respectivement le carter de direction ou la transmission au moins pendant la phase de durcissement de la composition (20).

2. Procédé selon la revendication 1, **caractérisé n ce qu**'une composition durcissabl (20) offrant un adhésion d'au moins 0,5 N/mm$^2$, en particulier supérieure à 0,8 N/mm$^2$, est utilisée.

3. Procédé selon la revendication 1 ou 2, **aract ri n ce que** la composition durcissable (20) est un masse de silicone.

4. Procédé selon l'une des revendications 1 à 3, **caractérisé en ce qu**'un carter d'huile (10) formé à partir de tôle d'acier ou bien en plastique et un bloc moteur (30) en fonte d'aluminium ou en fonte grise sont utilisés.

5. Procédé selon l'une des revendications 1 à 4, **caractérisé en ce que** la bordure du carter d'huile ou du couvercle est conçue sur le plan constructif de telle façon que, lors de l'assemblage du carter d'huile (10) sur le bloc moteur (30) et respectivement du couvercle sur le carter de direction ou la transmission, il se produit une fixation spontanée.

6. Procédé selon la revendication 5, **caractérisé en ce que** le carter d'huile (10) ou le couvercle présente une bordure de fixation (16) et le bloc moteur (30) et respectivement le carter de direction ou la transmission présente une flasque, et **en ce que** la fixation du carter d'huile ou du couvercle (10) s'effectue par enclenchement de la bordure de fixation (16) sur la bride (34).

7. Procédé selon l'une des revendications 1 à 4, **caractérisé en ce que** sur la bordure (12) du carter d'huile (10) et respectivement du couvercle sont formées des languettes (18) analogues à des barbes, lesquelles prennent appui contre une bride (34) sur le bloc moteur (34) et respectivement le carter de direction ou la transmission.

8. Procédé selon l'une des revendications 1 à 4, **caractérisé en ce que** la bordure du carter d'huile (10) et respectivement du couvercle est réalisée de telle façon que le carter d'huile (10) ou le couvercle peut être fixé sur le bloc moteur (30) et respectivement le carter de direction ou la transmission par un processus de formage subséquent à l'assemblage.

9. Procédé selon l'une des revendications 1 à 4, **caractérisé en ce qu**'après l'assemblage du carter d'huile (10) ou du couvercle sur le bloc moteur (30) et respectivement du carter de direction ou de la transmission, des étriers de retenue (40) sont appliqués, de façon à fixer le carter d'huile (10) ou le couvercle sur le bloc-moteur (30) et respectivement le carter de direction ou la transmission.

10. Procédé selon l'une des revendications 1 à 9, **caractérisé en c qu** les surfaces d'étanchéité (14,